

Accelerator Systems Division Highlights Ending February 18, 2005

ASD/JLAB: Cold Linac

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ASD/BNL: Ring.

Earlier this week we shipped the seventh (Ring) quad doublet assembly; it is to be installed in the upstream end of the extraction straight section.

Next week we will ship the eighth (last) quad double for the extraction straight section. With it, we will also ship the support frames, plates and brackets for the two IPM chambers.

Other equipment that is complete and being prepared for shipment includes:

- IPM chambers #1 and #2 (vacuum leak repaired).
- The downstream extraction kicker assembly (K2). This kicker assembly has been baked to 150C. The connecting adaptors between HV feed-thrus and the coils were taken out for equipment safety. We will send a tech to reinstall the adaptor links.

Installation drawings for the “Superperiod ‘C’ Extraction Straight Section” were approved, scanned and uploaded onto the BNL/SNS server this week.

17D224 – Pioneer Steel: pre-survey of the core is underway. The finished coils are being shipped to BNL by “special delivery” from vendor, Alpha Magnetics.

17ELS224 - the extraction Lambertson septum magnet (ELS) arrived at BNL this week. The magnet weighed in (as received) at 43,500 lbs. The magnet is undergoing incoming inspection which includes electro-mechanical acceptance testing.

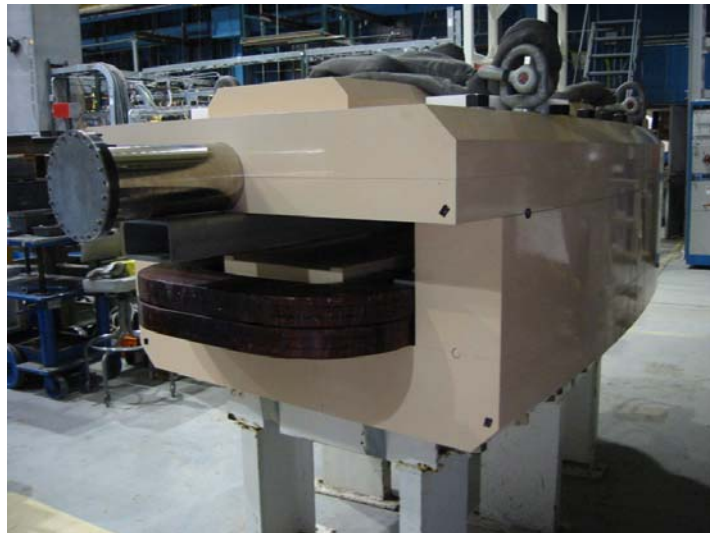
The BIG chamber is in the furnace for three day bake-out cycle over the holiday weekend. We plan to (NiT) coat it next week.

VFM: on schedule for completion by March 31.

Final assembly work continues on:

- The K1 extraction kicker magnet assembly.
- 17D224 magnet assembly (core, coil, vac)
- RTBT Q1/Q2 magnet assembly (mags, stand, vac)
- 36Q85 quads – assembly underway in NEBA, B912, high bay area.

Tom Russo (BNL/SNS Diagnostics) has been asked to develop a list of Post Handoff Support Options for consideration by ASD.



Controls

Preparations continued for moving operations to the CLO Central Control Room (CCR):

- TPS chassis and seismic mount, TPS enclosure, new PPS racks, and PPS consoles (minus tabletops) were delivered for installation in the CCR. These will be installed next week.
- Design of PA system additions (required to support operations from CCR) was finalized. Cabling and equipment are on order.
- Information required for IOC engineers to revise channel access security for their IOCs was posted. IOC engineers will soon implement the new security rules.
- We now have 5 fully functioning OPIs in the CCR. Several servers are fully online and operational after move from FE Control room.

Two of the seven SCL vacuum chassis have been modified (fuses added) to protect the backplanes. One of these chassis is back in service (HB1). Meanwhile JLAB has started preparations for procuring new backplane assemblies to replace the set that failed.

The HB5 vacuum rack is powered up and equipment installed. The IOC software was loaded to support cooldown of cryomodule HB5.

The DTL 3 RCCS PLC was updated to the latest version of Allen-Bradley ControlLogix software V13 and firmware V13.31. We will test the RCCS with new upgrade before updating all the RCCS PLCs. The update also included some PLC code changes to add control for the DI make-up water fill system. This will allow the RCCS water skid to fill automatically with DI water. This auto-fill functionality is also under test and will eventually be added to all the RCCS and QMCS PLCs.

Development of the latest LLRF FCM firmware continued in order to provide all the features that were available in the earlier version.

We continued to support the CF controls. Bad PV names were cleaned up in the CF EPICS databases and in archive request files. A demonstration of the alarm autodialer (which will be installed in the CUB very soon) was given to the CF Operations staff.

The Target Building communications cable design (required for the ICS) was issued for checking.

Ramp-off efforts continue at BNL. Two documents are under development supporting the LLRF application. One document is a user's guide for the application. The other is a developer's guide for supporting and maintaining the application. First versions of these applications have been checked into CVS at ORNL.

The VxWorks drivers for the line-sync system have also been checked into CVS, while hardware development and documentation continue.

Installation

Craft Snapshot 2/15/05

ASD productive craft workers	73.0
Foremen (Pd by 15% OH)	6.0
AMSI management (Pd directly)	3.0
TOTAL AMSI WORKERS	82.0
Less WBS 1.9, 1.2 etc	5.0
Less absent	3.0
TOTAL PD BY ASD/ORNL DB WPs	65.0

Accelerator Physics

Preliminary analysis of Bunch Shape Monitor (BSM) data from CCL module 1 shows larger than expected bunch lengths. Further analysis is underway to understand the cause of the bunch lengthening.

Analysis of transverse dynamics in the warm Linac also points to an increase in bunch length, as better agreement with measurement is obtained by reducing the space charge force, which could be due to a longer than expected bunch.

Exploratory work on the possibility of measuring the ring beam profile with electron tomography is underway. This method has been used previously to measure longitudinal distributions of electron beams. Preliminary work which includes the full 3-dimensional interaction between an electron and the real proton bunch show promising results.

Y. Zhang has obtained good agreement with Lloyd Young's previous work on the superconducting cavity fields induced by a drifting beam. This work is aimed at the possibility of obtaining relative beam/RF phase in SCL commissioning.

Operations

Warm Linac Tunnel is now classed as a Radiological Controlled Area, there are Buffer areas inside indicated by signs/chains/ropes. Do not cross these boundaries without RW1 training or an Escort with RW1 training.

Integrated Operations

Revisions coming in for the Conduct of Operations

Readiness Plan of Action for compliance with DOE 420.2B has been revised and is out for comment.

ARR Action Items

Meeting on closeout of post-start Action Items from the DTL4-6 and CCL 1-3 ARR

DataStream

Tracked Barcodes from the SCL RF, DTL-CCL Water systems, continuing work on the DTL-CCL

Vacuum

Tracking Test Equipment Calibrations

HVAC

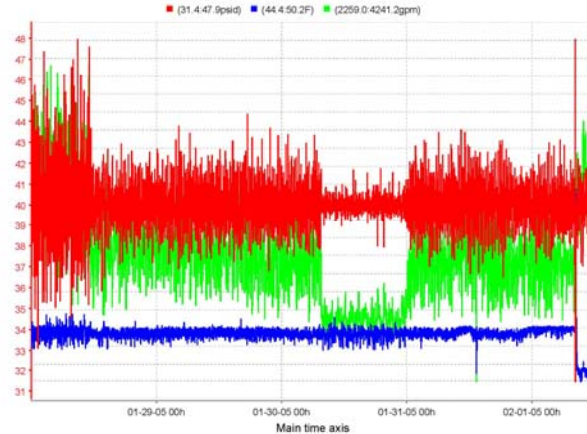
Several weeks ago, in looking at the Chilled water, I noted that the pressure instability was about 50%. I found that the HVAC PID loop controls had PID coefficients that were clearly wrong by factors of 10. This causing the hot and cold water loops to 'hunt'. I reprogrammed the FELK HVAC PID loops. This reduced the chilled water pressure instability by a factor of 3 and caused an immediate 50kW reduction in the power to the Chillers.

We cannot estimate the savings on the Hot water side because there is no real-time monitor of gas use by the boiler. It appeared that the same problem existed in the CLO HVAC, including the possibility of energy savings in HVAC operation. Note the following picture. On Sunday the boiler to the CLO went down, there was significantly reduced

Chilled Water use. When the CLO boiler came back on at 11:30 PM on a cold night, the Chilled Water use increased, suggesting that the Hot and Chilled water systems are fighting each other in the CLO HVAC as they were in the FELK.

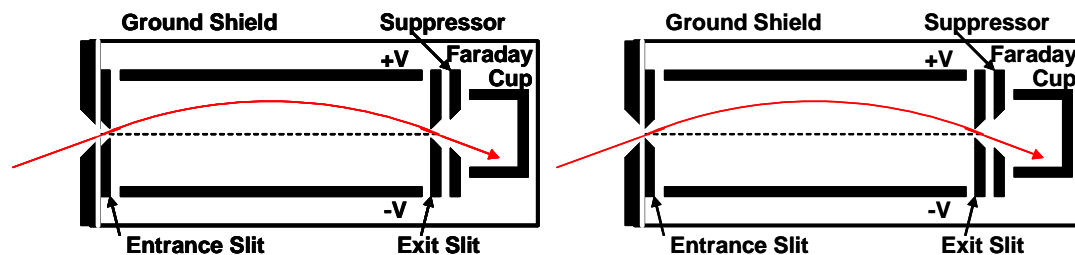
The CLO PID loops were reprogrammed using the parameters from the FELK. This resulted in an additional factor of 3 reduction in the Chilled water pressure variation and saved an additional 50 KW on the chillers.

In conclusion: I have reduced the pressure instability of the facility chilled water from 50% to 5% and saved 100 KW on the chillers, an unknown amount on the Gas use.



Ion Source

To reduce the likelihood of slit scattering, we have redesigned the entrance slits of the Allison emittance scanner. The figure on the right shows the new slits that can be installed with the $\pm 30^\circ$ taper facing away from the beam. The figure on the left shows original configuration where the 30° taper intercepted the beam. In the old configuration it was possible that the beam scattered off the water-cooled, $\pm 45^\circ$ tapered beam stop when misaligned. The scanner has an acceptance of less than 7° and therefore cannot see scattering from the tapered surfaces.



Survey and Alignment

S&A aligned High Beta Cryomodule (HB06) to ideal position.

We completed final alignment in the LINAC tunnel of warm sections HB04, HB05 and HB17.

We aligned the two 8q35's along with the beam pipe on a warm section raft located at the top of the ring. From there, it was transported to slot HB05 where it was final aligned to ideal position.

S&A rough aligned the two 8q35 magnets on one warm section located in the Magnet Measurement area of the CLO. This will be transported to Building 8330 where it will receive a beam pipe. From there, it will travel to the tunnel where we will perform alignment on the magnets and beam pipe.

We fiducialized two 8q35 warm section magnets located in the Magnet Measurement area of the CLO.

IN conjunction with ASD Physics, S & A continues the analysis of alignment data and coordinate locations for ring injection components. Progress is being made.

The monthly RTBT settlement survey was performed. A report will be issued next week.

Preliminary analysis work was conducted on the proposed plan for "Quadrant-wise" Ring re-observation surveys. This plan should allow us to essentially stiffen the degraded survey global network on a quadrant basis rather than the entire site. More to come as plan develops.

S&A aligned instrument line # 7 guide inside it's shutter housing. This was performed in the clean room hut of the Target Building.

We set concrete elevation marks on the concrete forms of instrument line 3 and instrument line 4.

See attached status report for greater details on SCL and HEBT/Ring/RTBT Alignment
<<SCL_STATUS_18_Feb_2005.pdf>>

.Mechanical

Ring Systems Installation

- The Ring Collimator straight section downstream Doublet Magnet assy was installed.
- The Ring Extraction straight section upstream doublet was received and staged for installation.
- The Ring straight section lattice components which have had their stands aligned are being prepped for grouting.
- The installation of the remote cooling connections for HEBT Collimator #1 was completed.
- The installation of the HEBT vacuum gauging was resumed.

Water Systems Installation

- Installation of the Linac SCL Cryo Warm Section Magnet cooling connections continued.
- Installation of the HEBT Collimator closed loop cooling system continued.
- Installation of the Ring SB Power Supply cooling system manifolds continued.
- Installation of the Ring Tunnel Magnet cooling connections continued.

We installed three warm sections this week. Another is assembled and ready for transfer to the tunnel

We have two SCL 8Q35's left to map.

We also mapped a third 21Q40 for the RTBT.

Electrical Group

Linac Tunnel – completed cable terminations for SCL module HB-7. Working on cable terminations for SCL modules HB-8 and HB-9, warm section terminations.

SCL ME-6 area – cable pulling and ac power installation, cable terminations in progress

SCL ME-7 area – cable tray, cable pulling and rack installation

SCL ME-8 area – ac power terminations, diagnostics and vacuum cable pulls and terminations in progress

Linac Rack installation is now complete.

Ring – ac power terminations for RF systems, PPS wiring, and rack installation in progress. Installing racks and trays in RF control room.

RTBT Tunnel – cable tray installation in progress

Completed integrated magnet/power supply/controls testing for SCL warm sections 12 (HB-1) and 13 (HB-2), bringing the completed warm section integrated magnet/power supply/controls tests to 12 of 34. SCL warm section 15 (HB-4) integrated magnet/power supply/controls testing started this week.

Completed integrated magnet/power supply/controls testing for 1 HEBT power supply: HEBT_MAG:PS_QV11. Testing started on HEBT_MAG:PS_QD11. This brings the number of completed HEBT integrated magnet/power supply/controls tests to 8 of 22.

SCL ME6 installation complete. Integrated test/checkout started.
SCL ME7 installation started.

HPRF

Ring RF

- Racks for the four Driver Amplifiers have been placed in their final location.
- The ground plane is now about 90% complete.
- Cooling water manifold has been extended to the Driver Amplifier racks.
- Cable tray in the Ring Service Building RF Control Room is complete including tray grounding.

LLRF

Installation: SCL ME-5 installation is nearly complete with measurement of Helix cable losses being the only remaining task. Installation of equipment in the ME-6 and ME-7 racks is in progress. Some of the ME-6 Helix cables have been terminated already, and we are awaiting completion of the remaining cable pulls.

Code Development: The new FPGA code for the Field Control Module is now fully supported by our EPICS Sequencer. We will be field testing this code when we resume cryomodule testing in March.

Cryo Group

HB4 cooled-down. HB5 is ready to be cool-down. Start working on HB6

Preparation for next week 2K testing

Cryo plant 24/7 support

2 warm pipe clean assembly

Utube modification in progress

Received new Recovery Compressor

Beam Diagnostics

BPM:

BPM is installed and a preliminary test completed prior to warm section installation
MB03-MB11 and HEBT installed and connected in the tunnel
HB01-HB05 next to be connected when area is clear
HB06-HB21 awaiting pull and DB termination of cables
Phase matched patch cables awaiting RF and Electrical group support for SCL and HEBT

Loss monitors:

Ion Chambers received from BNL and calibration is in process
MB03-HB3 and HEBT cables installed
HB4-HB21 long haul cable pulls in progress

Laser systems

MB01 (LW01) and MB02 (LW02) are being wired in preparation for installation on warm sections
LW01 and LW02 optics boxes are to be delivered for installation on warm sections 1 March

MB03 (LW03) and MB04 (LW04) are installed and have been function tested through the long haul cables
HB01 (LW12) through HB04 (LW15) and HB21 (LW32) are installed on the warm sections
HB01 (LW12) through HB04 (LW15) next to be connected when area is clear
HB21 (LW32) long haul cable termination in process

Timing/Reference

Timing Card: Cary is merging timing libraries
Working on procurement issues with timing card components

SCL Installation

Racks complete through row 15 (8 of 20)
Rack prep in progress for remaining 12 racks

HEBT Installation

BT to ground break equipment racks (HEBT Service Building)
Rack prep complete in HEBT
HEBT cabling complete except LW32 and Laser Stripping experiment

Software/Configuration

Laser Profile Monitor: Igor working on LV program.
BLM test stand: measurement automation
BLM IOC: Andrei working with Ernest Williams on 5100, documentation
Ch0 and Ch13: Merged ICS/Enterprise, Web page now shows messages
Harp: Compact RIO parts are in for controlling the pneumatic actuator system.
Copying data from BSM (and WS)

General

Purcell has been moving to and setting up BD portion of the lab in the CLO, C-141
Moved BD reconstructed front end workstation number 1. It is set up in the SDA and can be accessed.
We have a functioning presence in the software room.
Visitor account has been set up on Darryl's and Purcell's emergency access server for Johnny Tang and Wim to access the ICS network. This is completely temporary but they can at least work.
Concerns: We need to get our Workstations ordered for use in the CLO. Probably 4 of them. This should happen this week.